

REMARKS**Status of the Claims**

Claims 1, 3-8, 10-18, 22-25, 27-49 and 52 are currently pending. Claims 29-47 have been withdrawn as being drawn to nonelected inventions.

Rejections under 35 U.S.C. § 103

Claims 1, 3-8, 10-25, 27, 28, 48-49 and 52 stand rejected under 35 U.S.C. § 103(a) as allegedly being obvious over Craig (US 5,792,943, hereinafter “Craig”) in view of Goedert (US 4,935,040, hereinafter “Goedert”) and Manginell (US 6,666,907, hereinafter “Manginell”).

Applicants respectfully traverse this rejection for the reasons set forth below.

The obviousness analysis under 35 U.S.C. § 103(a) requires the consideration of the scope and content of the prior art, the level of skill in the relevant art, and the differences between the prior art and the claimed subject matter must be considered. *KSR Int’l Co. v. Teleflex Inc.*, 127 S.Ct. 1727 (2007) (citing *Graham v. John Deere Co.*, 383 U.S. 1, 17 (1966)). In appropriate circumstances, a single prior art reference can render a claim obvious. However, there must be a showing of a suggestion or motivation to modify the teachings of that reference to the claimed invention in order to support the obviousness conclusion. This suggestion or motivation may be derived from the prior art reference itself, from the knowledge of one of ordinary skill in the art, or from the nature of the problem to be solved. *Sibia Neurosciences, Inc. v. Cadus Pharmaceutical Corp.*, 225 F.3d 1349, 1356 (Fed. Cir. 2000) (citations omitted; emphasis added).

Regarding independent claims 1, 27 and 28, Craig allegedly discloses a gas chromatograph column (col. 12, l. 54 - col. 13, l. 1), which column comprises more than two lid layers and more than one channel layer (col. 4, l. 41-47 and fig. 6a-6b), wherein each of said layers comprises a compact material (see “substrate material”, col. 5, l. 1-8) suitable for gas chromatography (col. 12, l. 54 - col. 13, l. 1), said channel layers comprise microfabricated channels on both sides (col. 17, l. 8-11, and fig. 6a-6b) and a side of said lid layers form at least four

capillaries (“channel 260”, “channel 262”, fig. 6a-6b and col. 4, l. 41-47), said at least four capillaries are connected to each other through a hole in said channel layer to form an integrated capillary (“conduit means 272”, fig. 6a-6b), said integrated capillary is connected to outside atmosphere on both ends via holes on two outmost lid layers (implicitly disclosed in fig. 6a-6b) to serve as an inlet and an outlet (“aperture 270”, “aperture 278”, fig. 6a-6b).

The Office acknowledges that claim 1 recites a limitation regarding a manipulative step to bring about a specific product, i.e., coating the capillary wall before binding lid and channel layers together, which Craig fails to disclose. The Office argues that if the product in the product-by-process claim is the same as or obvious from a product of the prior art, the claim is unpatentable even though the prior art product was made by a different process.

Applicants respectfully submit that in contrast to the Office’s assertion, the product of the presently claimed invention is not the same as or even obvious from the product of the prior art. As has been stated before, the uniformity of coating thickness is extremely important to maintain very sharp separation peaks. The smoothness of the stationary phase coating the inside of a capillary column is a function of the profile symmetry. Pre-coating the microchannels with a stationary phase before the layers are bonded together solves the problem of uneven coating because the stationary phase liquid used for the coating never comes in contact with the joints before it dries up. A careful reading of Craig and Goedert reveals that neither reference teaches or even suggests pre-coating the microchannels with a stationary phase before the layers are bonded together. Therefore, the products by Craig and Goedert both have a major potential deficiency because they tend to accumulate coating on the corners or joints, leading to a suboptimal separation. Accordingly, the Office’s statement regarding “the product in the product-by-process claim is the same as or obvious from a product of the prior art” is not true.

The Office argues that alternatively it would have been obvious to one having ordinary skill in the art to coat the column prior to assembly since doing so was well known in the art as evidenced by Manginell, which allegedly teaches a fabrication process for a miniature chromatography column wherein the stationary phase is applied before the layers are bonded

together in order to achieve a uniform coating throughout the chromatography column (col. 4, l. 60 – col. 5, l.9).

Applicants respectfully disagree. A careful reading of the passage of Manginell cited by the Office reveals a different teaching from what the Office alleges. The whole paragraph spanning col. 4, l. 60 – col. 5, l. 9 is reproduced below for easy reference:

The inside surfaces of the channel 11 can be coated with a stationary phase material to enhance the separation of the chemical analytes of interest in the gas mixture to be analyzed. The stationary phase material can be a polymer having a specific chemical group with the proper physico-chemical interaction to cause separation of the analytes. The channel 11 can be coated with the stationary phase material by pushing a plug of the material through the channel 11 or by filling the channel 11 with a solvent containing the stationary phase material and then applying a vacuum to the end of the channel 11 to dry the solvent out of the channel 11. The stationary phase can also be applied by gas or liquid phase deposition into the channel 11 prior to bonding the lid 14 to the substrate 12. Instead of using a stationary phase material to coat the surfaces of the channel 11, the channel can alternatively be filled with a porous packing material to make a microfabricated packed GC column. (Emphasis added.)

According to the highlighted sentence, Manginell teaches depositing the stationary phase into the channel prior to the bonding of the lid to the substrate. Manginell does not teach, on the other hand, “depositing the stationary phase on the walls of said microfabricated channels and corresponding regions of said lid layers before said channel and lid layers are bound together,” as recited in the presently claimed invention. The difference between the teachings by Manginell and the present application is significant, because the former does not solve the problem of uneven coating inside of a capillary column. A closer look at Fig. 1 of Manginell shows that the capillary column 11 is already formed in the substrate 12, even prior to bonding of the lid 14 to the substrate 12. Therefore, the capillary column 11 already contains corners or joints which lead to unsatisfactory uniformity in coating thickness. On the other hand, the presently claimed invention deposits the stationary phase on the walls of the channel before they are formed, when they exist as grooves on the channel and lid layers. The different process of depositing the stationary phase on the walls of the microfabricated channels leads to an improved product over the products of the

prior art, namely, a gas chromatograph column with a channel that has uniformity of coating thickness, which is extremely important to maintain sharp separation peaks.

Thus, the cited combination of Craig in view of Goedert and Manginell fails to teach each and every element of the claimed invention. Accordingly, it is believed that the claims are in condition for allowance, and the outstanding rejections under 35 U.S.C. § 103(a) may properly be withdrawn.

In view of the above, each of the presently pending claims in this application is believed to be in immediate condition for allowance. Accordingly, the Examiner is respectfully requested to withdraw the outstanding rejection of the claims and to pass this application to issue. If it is determined that a telephone conference would expedite the prosecution of this application, the Examiner is invited to telephone the undersigned at the number given below.

In the event the U.S. Patent and Trademark office determines that an extension and/or other relief is required, applicant petitions for any required relief including extensions of time and authorizes the Commissioner to charge the cost of such petitions and/or other fees due in connection with the filing of this document to **Deposit Account No. 03-1952** referencing docket No. 514572000500. However, the Commissioner is not authorized to charge the cost of the issue fee to the Deposit Account.

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